

# Aqua

## Education & Public Outreach

NASA's Aqua satellite was launched on May 4, 2002, and since then has been collecting data about the Earth's atmosphere, biosphere, hydrosphere, and cryosphere. It has six Earth-observing instruments on board: the Atmospheric Infrared Sounder (AIRS), the Advanced Microwave Sounding Unit (AMSU-A), the Humidity Sounder for Brazil (HSB), the Advanced Microwave Scanning Radiometer for the Earth Observing System (AMSR-E), the Clouds and the Earth's Radiant Energy System (CERES), and the Moderate Resolution Imaging Spectroradiometer (MODIS). All six instruments except the HSB worked well for over nine years, well beyond the design life of the satellite. Four of the instruments—the AIRS, AMSU-A, CERES, and MODIS—continue to work well nine and a half years after launch.

### Dynamic Planet

A major element of the Aqua outreach efforts is to incorporate and display NASA satellite data sets onto the Dynamic Planet, which is a digital video globe that allows users to view and explore dynamic spherical data sets. Among the many data sets that the Aqua outreach effort incorporates onto the Dynamic Planet are data sets from the Aqua instruments. Through the Dynamic Planet, these data sets are viewed in a variety of venues and for many different audiences. Notably, the exhibit served as a primary backdrop to President Obama on November 23, 2009, as he announced the Administration's new Educate to Innovate campaign from the Dwight D. Eisenhower Executive Office Building in Washington, DC. Although the Dynamic Planet often projects Aqua data, in this particular photograph, the data set shown is a global biosphere data set from the Sea-viewing Wide Field-of-view Sensor (SeaWiFS). The Dynamic Planet was set up for this event by the Aqua Outreach Coordinator.



The NASA Science Explorer touch screen interface allows users of the Dynamic Planet to view and explore dynamic digital images of the Earth, other planets, and space.

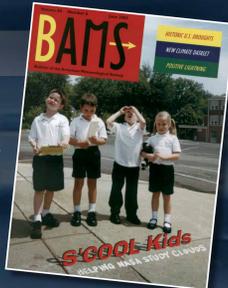
### EarthSky Podcasts

The Aqua Project has collaborated with EarthSky Communications to produce a series of Aqua/EarthSky radio shows and podcasts for the EarthSky website earthsky.org. The resulting radio digital media files have been distributed to more than 1900 broadcast affiliates around the world via the EarthSky Network, including 80% of all public radio stations in the U.S. Each 90-second science podcast is estimated to have created 14 million media impressions, with the overall series generating more than 84 million impressions around the world on topics related to the Aqua mission. Twelve shows were created, most with both 8-minute and 90-second versions, and several with Spanish-language as well as English-language versions. The 90-second versions have been broadcast over the radio, and all versions have been posted on the EarthSky website. Interviewees have included the Aqua Project Scientist, several of the Science Team leaders, and several of the Science Team members. This screenshot shows the EarthSky web page for the CERES Science Team leader's podcast on clouds and climate.



### Students' Cloud Observations On-Line (S'COOL)

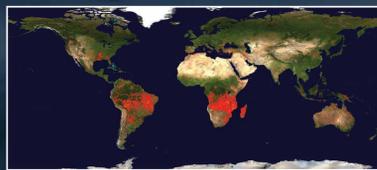
The S'COOL project offers hands-on science that produces useful ground truth data for the Aqua and Terra missions, through thousands of schoolchildren making and recording cloud-related observations timed for when the satellites are passing overhead. The project, supported primarily by the CERES Science Team centered at Langley Research Center (LaRC), focuses on cloud observation but introduces the idea of Earth System science through its integrated data-reporting sheet (clouds, surface cover, surface air conditions). The project, which recently recorded its 100,000th cloud observation, integrates math, science, technology, and other subject areas in formal education lessons and activities designed for students in grades K-12. The image shows the S'COOL project highlighted on the cover of the June 2003 *Bulletin of the American Meteorological Society*.



### MODIS Rapid Response System (RRS)

The MODIS instrument is on both the Aqua and the Terra satellites and provides data that have proven to have many immediate practical applications. As a result, the MODIS Science Team created a MODIS Rapid Response System (RRS) to get societally relevant images out to users and the public very quickly. The MODIS RRS has become an important component in the Aqua and Terra missions and in NASA's overall Earth science research program. Since 2000, it has been producing and disseminating, in close to real time, photograph-quality MODIS images. MODIS RRS images are routinely used by a global community of scientists and others working in fire monitoring, agriculture, ice monitoring, air quality, education, and media. An average of 144,000 unique visitors comes to the site every month, and a recent Google search of "MODIS Rapid Response" returned 136,000 results. In addition to providing much of the MODIS imagery that appears on NASA's Earth Observatory and Visible Earth web sites, MODIS RRS also provides imagery to NASA Public Affairs, the S'COOL program, museums such as the National Museum of Natural History, and a variety of media outlets ranging from National Geographic to the History Channel.

Global 10-day fire maps are generated using the MODIS RRS fire locations to represent the current fire activity across the world.



On May 9, 2010, oil continued to flow from a damaged offshore oil well in the Gulf of Mexico, as shown in this image from Aqua's MODIS instrument.

Aqua's MODIS instrument captured this natural-color image of Hurricane Igor in the North Atlantic on September 13, 2010. Igor shows all the characteristics of a strong hurricane, including a distinct eye and spiral arms spanning hundreds of kilometers.

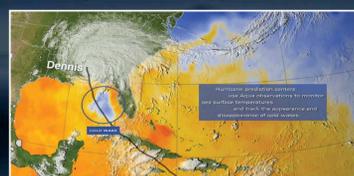


### ViewSpace

ViewSpace is a popular and growing network of auto-updating multimedia astronomy and Earth science exhibits that are produced by the ViewSpace production team at the science and operations center of NASA's Hubble Space Telescope and its successor, the James Webb Space Telescope. ViewSpace uses Internet-fed digital signage technology to provide an ever-changing kaleidoscope of inspiring and educational presentations of the latest astronomy and space-based Earth science. ViewSpace screens are on display at numerous science centers, museums, planetariums, nature centers, national park visitor centers, NASA visitor centers and building lobbies, observatory visitor centers, and libraries.



In a successful 2008 effort, the Aqua team worked with the ViewSpace production team to create an 18-minute ViewSpace feature showcasing the science and applications of the Aqua mission. These images are screenshots from the finished production.



### AIRS Outreach at the Jet Propulsion Laboratory

In addition to outreach to hundreds, thousands, or even millions of people, Aqua also has very pointed and intense outreach efforts to specific individuals. For instance, the AIRS Project at the NASA Jet Propulsion Laboratory (JPL) hosted high school student intern Jarrod Suda (pictured at right) for six weeks during the summer of 2011. Mentored by the AIRS Outreach Coordinator and four JPL scientists, Jarrod was given the opportunity to learn and use MATLAB and the GIOVANNI image analysis tool to study temperature inversions. He also wrote articles for the AIRS website, created a video of AIRS animations, attended team meetings and seminars, and gave a final presentation to project management and scientists. At the conclusion of his experience, Jarrod was selected for a feature story by the Pasadena Star News for an article about interesting internships.



AIRS Outreach supported the Earth science presence at "Girltopia," an event sponsored by the Girl Scouts of America and held at the Los Angeles Convention Center on October 29, 2011. At the sold-out event, thousands of girls explored leadership, arts, business, science, and technology through interactive exhibits, speakers, and workshops. The AIRS team partnered with Cloudsat outreach personnel on a fun experiment to create a cloud in a bottle in order to convey the science behind cloud formation. The demonstration drew crowds all day long (see photos at left).



AIRS Outreach Coordinator Sharon Ray, on a 2010 trip to Africa, distributed NASA calendars and AIRS lenticular cards to Maasai tribesman in Tanzania (photo at right). Sharon was able to describe the images through an interpreter.



### Engineering Competition

In 2002 and 2003, the Aqua Education and Public Outreach team, along with the NASA Goddard Space Flight Center Education Programs Office, the Earth Observing System Mission Operations Office, Morgan State University in Baltimore, Maryland, DuVal High School in Greenbelt, Maryland, and the Baltimore Museum of Industry, sponsored the Aqua Engineering Competition for High School Students. The competition consisted of two rounds of problem solving: a qualifying round during which teams had 10 weeks to solve a real-world Aqua problem, and a subsequent round during which the finalists had to solve a hypothetical problem in 90 minutes during the final day of the competition. In the 90-minute round, the teams were tasked with determining how best to operate a supposed malfunctioning Solid State Recorder (SSR), including calculations for data loss based on specific SSR temperatures and bit error rates. The five finalist teams analyzed, sorted, and crunched data using their problem-solving skills, then prepared a final PowerPoint presentation and presented it to the judging panel. Following the judging, an awards ceremony was held at the NASA Goddard Visitor Center.



### Vodcasts



The Aqua mission and NASA Goddard TV have collaborated on a series of six video vodcasts (i.e., vodcasts). The first vodcast, which is completed, provides an overview of the Aqua mission. Four of the five remaining vodcasts will each feature topics highlighting the Aqua instrument teams, and the final vodcast will describe Aqua contributions to Applications. Each vodcast is approximately 4 minutes in duration and will be distributed through the Aqua homepage, the NASA Goddard homepage, the NASA portal, Apple's iTunes, and YouTube. The images at left are screen shots from four of the six vodcasts and feature (top to bottom): Mous Chahine, former AIRS Science Team Leader; Roy Spencer, U.S. AMSR-E Science Team Leader; Norman Loeb, CERES Science Team Leader; and Michael King, MODIS Science Team Leader.

### Webcasts

An early highlight of Aqua outreach was a series of webcasts produced by the Goddard Special Project Initiatives (SPI) Office, in conjunction with Aqua mission scientists and staff. In the years 1999-2003, several interactive webcasts were completed from exciting places, including: an Inuit School in Resolute Bay, Canada; the North Pole; the clean room at TRW in Redondo Beach, California, where the Aqua spacecraft was being assembled; Hawaii's Mauna Kea volcano and Snug Harbor Marine Optical Buoy (MOBY) facility; Vandenberg Air Force Base in Lompoc, California, in the early morning hours before, during, and after the launch of the spacecraft; and validation sites in Colorado, as part of the Cold Land Processes Experiment. The two images at right were taken during the webcast from TRW, the top left image was taken during the MOBY webcast, and the bottom left image was taken during the Mauna Kea webcast.



### Women of Goddard Book and Exhibit

In 2011, the Aqua project became involved in a collaboration with the Maryland Women's Heritage Center, in the Heritage Center's preparations for a major new exhibit on Maryland Women in Science, Technology, Engineering, and Mathematics. With NASA's Goddard Space Flight Center located in Maryland and many of the Aqua activities centered at Goddard, it became logical for the Aqua mission to be involved in this exhibit. A book, six posters, and a touchscreen interface were created. The book, entitled *Women of Goddard: Careers in Science, Technology, Engineering, and Mathematics*, contains profiles of 103 women, several of whom are connected with the Aqua mission; the six posters include one, pictured here, that is exclusively on the Aqua mission; and the touchscreen interface includes 13 short clips, one being a 4-minute overview of the Aqua mission by the Aqua Project Scientist. The exhibit opened at the Maryland Women's Heritage Center in downtown Baltimore on November 14, 2011, and should be up for at least a year.

